



Light-Duty Vehicle Operator Survey: Summary of January 1996 Data Collection Period

Introduction

This project has been implemented to replace the previous data card system to obtain more candid and accurate data on light-duty vehicles (LDV) operating on alternative fuels. The primary objective of this operator survey is to collect performance and driveability data on alternative fuel vehicles (AFVs) and comparable gasoline vehicles. The data was collected via a telephone survey in which drivers of AFVs and fleet managers with AFVs in their fleet were contacted.

This was the first survey period of four planned for this calendar year. Each survey round will be conducted during a different season to capture any seasonal differences. This first survey round was conducted during the winter. The surveys were conducted by Dwights Energydata for the National Renewable Energy Laboratory (NREL). The data was supplied to and analyzed by NREL. Data was collected on dedicated compressed natural gas (CNG) vehicles, gasoline vehicles converted to operate on CNG (most were bi-fuel after conversion), flexible-fuel ethanol (E85) vehicles, and flexible-fuel methanol (M85) vehicles. These surveys were conducted with federal government fleet managers and drivers who operate AFVs or gasoline vehicles as a regular part of their work assignment. The majority of the AFVs and gasoline vehicles are leased from the General Services Administration (GSA), with the exception being the vehicles converted to operate on compressed natural gas. The converted vehicles evaluated by this survey were owned by the federal agency which operates the vehicles.

The surveys were conducted with fleet managers and drivers operating vehicles in various cities and states across the country. Fleet managers surveyed were selected randomly from a contact list of fleets provided by GSA. All the fleet managers in the GSA contact list had AFVs in their fleet. Contacts at fleets operating CNG conversions were randomly selected from sites involved in the DOE/NREL vehicle conversion project. Drivers surveyed were randomly selected from a contact list developed by contacting fleet managers from the GSA and CNG conversion fleet manager lists. The drivers contacted are not necessarily associated with the fleet managers who participated in the survey during this period. Although fleet managers and drivers were contacted randomly, we did focus on conducting surveys with operators located in areas of the country where alternative fuels were available. A summary of the fleet and driver survey results is provided in the sections that follow.

NREL is a national laboratory of the U.S. Department of Energy (DOE). This survey was conducted for DOE by NREL's Center for Transportation Technologies and Systems.

Fleet Manager Survey Results

The fleet manager survey focuses on the fleet perspective of AFV performance and maintenance compared to similar gasoline-fueled vehicles. During this survey period, fleet managers in 17 different states were contacted. Each fleet manager was asked to identify the primary alternative fuel used by AFVs in their fleet (several fleet managers have more than one type of alternative fuel vehicle in their fleet). The 50 fleet managers contacted were categorized as follows:

Primary Alternative Fuel	No. of Fleet Mgrs.	Fleet managers who operate more than one vehicle model on primary alternative fuel	Fleet managers who operate vehicles on other alternative fuels
CNG-OEM ¹	11	2	-
CNG-Conversion	8	8	-
E85	14	5	2 (CNG)
M85	17	5	2 (CNG, E85)
Total	50	20	-

¹Original equipment manufacturer

The number of vehicles in the fleets represented by these fleet managers is summarized in the following table:

Fleet Size (No. of Vehicles)	Fleets (total LDVs)		Total AFVs in All Fleets	
	No.	(%)	No.	(%)
10 or less	22	44	40	80
11 to 50	7	14	4	8
51 to 100	3	6	6	12
101 to 200	4	8	0	0
more than 200	14	28	0	0

When asked if drivers of their fleet vehicles specifically requested AFVs, fleet managers provided the following information:

Response	Fleet Managers responding this way	
	No.	(%)
Don't want AFV	15	30
Want AFV	7	14
Neutral	27	54
Have not noticed	1	2

When asked why drivers of their fleet vehicles wanted, didn't want or were neutral about the AFVs, three responses were common: 1) lack of vehicle range (all fleets with CNG vehicles); 2) lack of convenient refueling or no alternative fuel available (most common for alcohol fueled vehicles); and 3) drivers are not given a choice of vehicle.

Fleet managers were asked if drivers of their fleet vehicles tend to report more vehicle performance complaints about AFVs or gasoline vehicles. Thirty-four (68%) of the 50 fleet managers indicated that the number of performance complaints were equal between AFVs and gasoline vehicles, and 16 (32%) reported that the AFVs received more complaints. When asked about the types of complaints they had received from their AFV drivers over the last month, fleet managers reported the following:

Complaints about AFVs	Fleet Managers who received complaints		Fleet Managers without complaints	
	No.	(%)	No.	(%)
Hard to start	5	10	45	90
Stalled in traffic	1	2	49	98
Lack of Power	1	2	49	98
Check engine light on	2	4	48	96

Fleet managers were also asked about driver reports of stalling after starting, poor idle quality, hesitation, and engine ping in AFVs, but none reported receiving any of these complaints.

The fleet managers were next asked about their AFVs practices. Thirty (60%) of the 50 fleet managers reported that there was *not* an alternative fuel station reasonably close to them, and 28

(56%) of the 50 reported that alternative fuel stations were hard to find (i.e., there are not enough stations). When asked if the AFVs in their fleet were usually fueled with an alternative fuel or gasoline, the following information was obtained:

Fuel Usually Used in AFVs	All Fleet Managers Responding This Way		Responses of Fleet Managers Whose Primary AFV Type Is:							
			CNG-OEM		CNG-Conversion		E85		M85	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
Alternative Fuel	30	60	11	100	5	62.5	8	57	6	35
Gasoline	19	38	0	0	2	25	6	43	11	65
Don't know	1	2	0	0	1	12.5	0	0	0	0
Total	50	100	11	100	8	100	14	100	17	10

It is not surprising that the CNG-OEM vehicles were operated 100% of the time on CNG, because most of the CNG vehicles in the GSA fleet are OEM dedicated-fuel vehicles. It is, however, interesting to note that fleets operating CNG conversions also tended to fuel most of the time with CNG. The alcohol flex-fuel vehicles (E85 and M85) appear much more likely to be operated on gasoline, as more than 50% of the fleet managers with flex-fuel vehicles indicated that their vehicles were usually operated on gasoline.

Finally, fleet managers were asked questions related to vehicle maintenance. The majority of fleet managers (80%) indicated that no different or additional scheduled maintenance was required on the AFVs. The only feedback related to regular or scheduled maintenance was that M85 and E85 vehicles required use of a special oil. The fleet managers were also asked about the frequency and types of unscheduled maintenance. Again, the majority (>80%) experienced no difference in the types or frequency of unscheduled maintenance for AFVs. The 18% reporting differences in the frequency and types of unscheduled repairs did not experience similar types of problems, although 8 out of 9 of the fleet managers indicating additional unscheduled maintenance operate CNG AFVs.

The last maintenance related question related to AFV versus gasoline vehicle downtime. A full 90% of the respondents indicated that the vehicle downtime is about the same for AFV and gasoline vehicles in their fleet (all reported an average of less than one day per month). Of the 10% who indicated downtime differed, all indicated that AFVs had more downtime than gasoline vehicles.

Driver Survey Results

The driver survey concentrates on the operator's subjective assessment of performance of different AFVs compared to similar gasoline vehicles. The drivers were asked several questions to determine how much driving they do at work and whether they could identify the vehicle they operate at work as an AFV. The goal was to survey 50 drivers of each of the following types of AFVs fueled with each of the following fuels: CNG-OEM, CNG conversions, E85, and M85, as well as 50 drivers of gasoline vehicles.

Vehicle and Driver Information

The following table summarizes the number of drivers surveyed by fuel type:

Vehicle Type	No. of Drivers Surveyed	% of Driver Surveys
CNG-OEM	47	19.3
CNG-conversion	52	21.4
E85	50	20.6
Gasoline	44	18.1
M85	50	20.6
Total	243	100

In order to make the most direct comparison possible between AFVs and gasoline controls, some restrictions were imposed on the use of information from certain gasoline makes and models. Six surveys from drivers of gasoline vehicles were excluded from the data set because the vehicles involved were not similar to the AFVs in the survey. In addition, three driver surveys involved vehicles originally included in the CNG-OEM category but were moved to the CNG conversion category. Also, one survey associated with a CNG conversion was deleted because the vehicle was not an LDV. The vehicles included in the survey, including their locations, are summarized in Appendix A.

More than 93% of the drivers indicated they are assigned the vehicles they drive, and have no choice in vehicle selection. The amount of time the drivers had driven their vehicles as well as their driving characteristics are indicated below:

Time Driven	Drivers		Miles Driven in Typical Week	Drivers		Highway Driving	Drivers	
	No.	%		No.	%		No.	%
6 months or less	48	20.4	less than 25	23	9.5	less than 10%	86	35.4
6 months to 1 year	89	37.9	26 to 50	45	18.5	11% to 25%	29	11.9
1 to 2 years	73	31.1	51 to 100	50	20.6	26% to 50%	48	19.7
2 to 3 years	24	10.2	101 to 200	42	17.3	51% to 75%	40	16.5
more than 3 years	1	0.4	more than 200	83	34.1	76% to 100%	40	16.5

Refueling Information

Ninety-one percent of the drivers in the survey indicated that they refueled their own vehicles. AFV drivers were asked what percent of the time they used alternative fuel in the vehicles, and their answers are summarized in the following table:

Percentage of Time Alternative Fuel Used	Drivers of Vehicles Fueled by:							
	CNG		CNG-Conversion		Ethanol		Methanol	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
none (only gasoline)	0	-	4	7.7	20	40	24	48
5% to 25%	0	-	10	19.2	6	12	9	18
26% to 50%	0	-	22	42.3	3	6	6	12
51% to 75%	0	-	3	5.8	4	8	2	4
76% to 100%	47	100	13	25	17	34	9	18

The CNG vehicles operating on CNG less than 100% of the time are all bi-fuel conversions. The results indicate that nearly all the flex-fuel alcohol and bi-fuel CNG vehicles are operated a fair amount of the time (>25%) on gasoline. When asked whether an alternative fuel station was within a reasonable distance from where most of their driving was done, about 53% of the drivers responded “yes”. Almost all of these drivers (94%) indicated that a fueling station had to be less than 2 miles away to be convenient. The following table summarizes responses from drivers of AFVs regarding some attributes of alternative fuel refueling stations:

Fueling Station Attribute	Acceptable		Marginal		Not Acceptable		Total	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
Accessibility	94	58	25	16	42	26	161	100
Hours of Operation	136	86	12	8	10	6	158	100
Ease of filling- Compared to gasoline	138	87	9	6	11	7	158	100

The majority (93%) of drivers had no personal concerns about refueling their AFV. The few concerns that were indicated had to do with the persistence of the fuel smell (E85 and M85), and pressurization of CNG. Approximately 19% of the AFV drivers did not provide responses to the fueling station question, the answers to which are tabulated above. In general, these were drivers of flex-fuel or bi-fuel vehicles who operated their vehicles only on gasoline.

Vehicle Performance Information

Drivers were asked to provide an overall evaluation of how their vehicles perform. The results are tabulated below:

Vehicle Performance Rating	Drivers of Vehicles Fueled by:											
	All		CNG-OEM		CNG-Conversion		E85		Gasoline		M85	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
Excellent	47	19	11	23.4	5	9.6	19	38.8	8	18.2	4	8.0
Very Good	152	63	23	48.9	28	53.8	29	59.2	33	75.0	39	78.0
Average	29	12	7	14.9	12	23.1	1	2.0	3	6.8	6	12.0
Fair	10	4	4	8.5	5	9.6	0	0	0	0	1	2.0
Poor	4	2	2	4.3	2	3.8	0	0	0	0	0	0

Drivers generally rated all the vehicle types as average or better. Vehicles receiving the lowest ratings tended to be AFVs operating on CNG. When drivers were asked how an AFV compares to similar gasoline vehicles, or vice versa, the following information was obtained:

Vehicle Comparison	AFV Driver (AFV compared to gasoline)		Gasoline Vehicle Driver (gasoline compared to AFV)	
	No.	(%)	No.	(%)
Better	15	9.1	3	20
About the same	94	57.3	11	73.3
Not as well	55	33.5	1	6.7

The majority (66%) of AFV drivers said their vehicles were no different from, or compare favorably to, gasoline vehicles. AFV drivers who reported vehicle performance as not being as good as gasoline vehicles were largely operators of CNG-OEM or CNG conversion vehicles. When asked why they felt the AFVs performed worse, limited vehicle range and lack of power were the most common responses. It is important to note that a significant number of the surveyed drivers (18% or 36 of 199 AFV drivers and 66% or 29 of 44 gasoline vehicles drivers) did not provide an answer to this question. In general, the non-responding drivers of AFVs had only driven their vehicle on gasoline and the non-responding gasoline drivers had never driven an AFV, so these drivers felt they had no basis for comparison.

Next, drivers were asked whether they had experienced any performance related problems with their vehicle over the last month. The “yes” responses are summarized below:

Performance Problem	Number of Reports from Drivers of Vehicles Fueled by:				
	CNG-OEM	CNG-Conversion	E85	Gasoline	M85
Hard to Start	7	11	3	1	4
Stalled after starting	3	4	2	-	
Stalled in traffic	1	3	1	-	3
Poor Idle	1	6	-	-	2
Hesitation	-	1	2	-	
Lack of Power	-	3	-	-	1
Check Engine Light	-	-	-	-	1
Total	12	28	8	1	11

Drivers were also asked if their vehicle had exhibited any engine ping, but there were no reports of this problem.

Drivers of CNG conversions reported the most problems, and drivers of gasoline vehicles reported the least problems. Overall, few problems were reported, but the results tend to indicate that there is more difficulty with alternative fuel vehicles than with gasoline vehicles. The most commonly reported problem involved vehicles being hard to start. Comparable information over different seasons is not available yet.

Next, drivers were asked to rate the acceleration of their vehicles. The following table summarizes the responses:

Vehicle Acceleration Rating	Drivers Vehicles Fueled by:											
	All		CNG-OEM		CNG-Conversion		E85		Gasoline		M85	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
Excellent	14	5.8	3	6.4	0	0	6	12.0	2	4.5	3	6.0
Very Good	167	68.7	32	68.1	20	38.5	40	80.0	36	81.8	39	78.0
Average	52	21.4	11	23.4	26	50.0	4	8.0	5	11.4	6	12.0
Fair	10	4.1	1	2.1	6	11.5	0	0	1	2.3	2	4.0
Poor	0	0	0	0	0	0	0	0	0	0	0	0

None of the drivers rated their vehicles' acceleration as poor, although the CNG AFVs received significantly more average and fair ratings than the gasoline and alcohol-fueled vehicles.

The final performance question asked of drivers was how satisfied they were with the vehicle range on a tank of fuel. The results are tabulated below:

Vehicle Range Rating	Drivers of Vehicles Fueled by:											
	All		CNG-OEM		CNG-Conversion		E85		Gasoline		M85	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
Acceptable	162	67.5	7	14.9	22	44.9	45	90.0	44	100	44	88.0
Marginal	57	23.8	24	51.1	23	46.9	5	10.0	0	0	5	10.0
Not Acceptable	21	8.7	16	34.0	4	8.2	0	0	0	0	1	2.0

In general, drivers of CNG-fueled vehicles were the least satisfied with the driving range, with 34% of the CNG-OEM vehicle drivers rating range as not acceptable. All drivers of gasoline vehicles were satisfied with their driving range.

Drivers were asked what their overall satisfaction level was with the vehicle they drive at work. They were asked to think about performance, convenience and any other factors that influenced them while driving and their answers are summarized below:

Overall Vehicle Satisfaction Level	Drivers of Vehicles Fueled by:											
	All		CNG-OEM		CNG-Conversion		E85		Gasoline		M85	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
Very satisfied	53	21.8	9	19.2	5	9.6	18	36	15	34	6	12
Leaning toward satisfied	149	61.3	24	51	32	61.5	31	62	28	63.6	34	68
Neutral	21	8.6	4	8.5	7	13.5	1	2	1	2.3	8	16
Leaning toward dissatisfied	11	4.5	6	12.8	4	7.7	0	0	0	0	1	2
Dissatisfied	9	3.7	4	8.5	4	7.6	0	0	0	0	1	2

The majority (83%) of drivers were satisfied or very satisfied overall with their vehicle. The majority of dissatisfied drivers (18 out of 20) operated CNG-OEMs or CNG conversions.

After providing their satisfaction rating the drivers were asked what influenced them most in making this evaluation. The most common response was that the vehicle performs well. Some

drivers of AFVs also indicated that their vehicles perform well on gasoline or perform like gasoline vehicles. The most common negative response was associated with poor mileage or range of the CNG-OEM vehicles. When asked if they had any other comments about their vehicles, several drivers noted concerns about the safety of CNG vehicles, some noted the environmental benefit of CNG vehicles, some drivers of the alcohol flex-fuel vehicles commented that alcohol fuel was not available in their areas for them to use, and some drivers of CNG vehicles again complained about the lack of vehicle range.

The AFV drivers were asked if they would recommend a vehicle that operates on an alternative fuel to somebody else. The results are summarized below:

Recommend d AFV	Drivers of Vehicles Fueled by:									
	All AFVs		CNG-OEM		CNG-Conversion		E85		M85	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
Yes	98	62	22	46.8	33	68.8	25	80.6	18	56.3
No	60	38	25	53.2	15	31.2	6	19.4	14	43.7

Some drivers (37%) of alcohol-fueled vehicles did not respond to this question, because they had never operated their vehicles on an alternative fuel. Drivers of AFVs who would not recommend them to others were asked to identify the single most important reason they would not recommend AFVs. The two most common answers were lack of fueling stations (~45%) and unacceptable vehicle range (~33%, answers were all from drivers of CNG vehicles).

Summary

The first quarter survey round was completed with responses from 50 fleet managers and 243 drivers of federal fleet vehicles. The major survey findings were:

From fleet managers:

- Drivers of vehicles in their fleets did not want AFVs because they lack range (CNG vehicles), or because there were no convenient fueling facilities available.
- Nearly 70% of fleet managers indicated they received the same number of performance complaints about AFVs and gasoline vehicles.
- 60% reported their AFVs usually refueled with alternative fuel.

- More than 80% reported no difference in types or frequency of unscheduled maintenance, but 8 out of 9 who did report differences operated CNG vehicles.

From drivers:

- The majority of alcohol-fueled vehicles (~68%), and CNG conversions (~69%) are operated more than 50% of the time on gasoline.
- More than 50% of AFV drivers indicated an alternative fuel station was within a reasonable distance. More than 90% indicated a station had to be less than 2 miles away to be convenient.
- More than 80% of AFV and gasoline drivers rated overall vehicle performance as very good or excellent. The only vehicles to receive any poor performance ratings were CNG-fueled.
- Performance complaints were low overall, but there were more problems reported for AFVs than gasoline vehicles.
- Vehicle range was reported as marginal or not acceptable by 85% of CNG-OEM drivers and 55% of CNG conversion drivers. Most alcohol-fueled (>85%) and all gasoline-fueled drivers were satisfied with their vehicle range.
- More than 80% of drivers were generally satisfied with their vehicle. Nearly all dissatisfied drivers operated CNG vehicles.
- 62% of AFV drivers would recommend AFVs to others. The most common reasons *to not* recommend AFVs was lack of refueling stations, and lack of range for CNG vehicles.

Appendix A: Surveyed Drivers' Vehicles and Location (January 1996 Survey Period)

MODEL	YEA R	City	State	Fuel	MODEL	YEAR	City	State	Fuel
Caravan	1994	Argonne	IL	CNG	Taurus	1994	McLean	VA	E85
Caravan	1994	Argonne	IL	CNG	Taurus	1994	St. Louis	MO	E85
Caravan	1994	Washington	DC	CNG	Taurus	1994	St. Louis	MO	E85
Caravan	1994	Ellenwood	GA	CNG	Taurus	1994	St. Louis	MO	E85
Caravan	1994	Atlanta	GA	CNG	Taurus	1994	Chicago	IL	E85
Caravan	1994	Charlotte	NC	CNG	Taurus	1994	Argonne	IL	E85
Caravan	1994	Research Triangle Park	NC	CNG	Taurus	1994	Des Plaines	IL	E85
Caravan	1994	Camp Pendelton	CA	CNG	Taurus	1995	Argonne	IL	E85
Caravan	1994	Atlanta	GA	CNG	Taurus	1995	Indianapolis	IN	E85
Caravan	1994	Los Alamos	NM	CNG	Taurus	1995	Schiller Park	IL	E85
Caravan	1994	Austin	TX	CNG	Taurus	1995	Chicago	IL	E85
Caravan	1994	Austin	TX	CNG	Taurus	1995	Chicago	IL	E85
Caravan	1994	Jackson	MS	CNG	Taurus	1995	Des Plaines	IL	E85
Caravan	1994	Hyattsville	MD	CNG	Taurus	1995	Des Plaines	IL	E85
Caravan	1994	Hyattsville	MD	CNG	Taurus	1995	Des Plaines	IL	E85
Caravan	1994	Atlanta	GA	CNG	Taurus	1995	Des Plaines	IL	E85
Caravan	1994	Pittsburgh	PA	CNG	Taurus	1995	Des Plaines	IL	E85
Caravan	1994	Ft. Jackson	SC	CNG	Taurus	1995	Des Plaines	IL	E85
Caravan	1994	Charlotte	NC	CNG	Taurus	1995	St. Louis	MO	E85
Caravan	1994	Putman	CA	CNG	Taurus	1995	St. Louis	MO	E85
Caravan	1995	Camp Pendelton	CA	CNG	Taurus	1995	St. Louis	MO	E85
Chevy C1500	1992	Amarillo	TX	CNG	Taurus	1995	St. Ann	MO	E85
Chevy C1500	1992	Robbins AFB	GA	CNG	Taurus	1995	St. Louis	MO	E85
Ram Van	1992	Putman	CA	CNG	Taurus	1995	St. Louis	MO	E85
Ram Van	1992	Ft. Carson	CO	CNG	Taurus	1995	St. Louis	MO	E85
Ram Van	1992	Washington	DC	CNG	Taurus	1995	St. Louis	MO	E85
Ram Van	1992	Kennedy Space Center	FL	CNG	Taurus	1995	St. Louis	MO	E85
Ram Van	1992	Washington	DC	CNG	Taurus	1995	St. Louis	MO	E85
Ram Van	1992	Harlan	LA	CNG	Acclaim	1994	Washington	DC	GAS
Ram Van	1993	Argonne	IL	CNG	Acclaim	1994	Brookings	SD	GAS
Ram Van	1993	Putman	CA	CNG	Aerostar	1995	Kansas City	MO	GAS
Ram Van	1993	Putman	CA	CNG	Caravan	1992	Putman	CA	GAS
Ram Van	1993	Putman	CA	CNG	Caravan	1992	Golden	CO	GAS
Ram Van	1993	Putman	CA	CNG	Caravan	1992	Billings	MT	GAS
Ram Van	1994	Charlotte	NC	CNG	Caravan	1992	Golden	CO	GAS
Ram Van	1994	Glynco	GA	CNG	Caravan	1993	Aurora	CO	GAS
Ram Van	1994	Batavia	IL	CNG	Caravan	1994	Poplar	MT	GAS
Ram Van	1994	Amarillo	TX	CNG	Caravan	1995	Washington	DC	GAS
Ram Van	1994	Reno	NV	CNG	Chevy Blazer	1994	Westminister	CO	GAS
Ram Van	1994	Denton	TX	CNG	Chevy Pick-up	1995	Milford	CT	GAS
Ram Van	1995	Putman	CA	CNG	Chevy Suburban	1993	Camp Rilea	OR	GAS
Ram Van	1995	Kirtland AFB	NM	CNG	Corsica	1993	Washington	DC	GAS
Ram Van	1995	Glynco	GA	CNG	Corsica	1993	Quincy	IL	GAS
Ram Van	1995	Golden	CO	CNG	Corsica	1993	Newark	DE	GAS
Ram Van	1995	Golden	CO	CNG	Corsica	1993	Branford	CT	GAS
Ram Van	1995	Reno	NV	CNG	Corsica	1993	Washington	DC	GAS
Ram Van	1995	Golden	CO	CNG	Corsica	1994	Indianapolis	IN	GAS
Caprice	1990	Glynco	GA	CNG-CON	Corsica	1994	Quincy	IL	GAS
Caravan	1990	Camp Pendelton	CA	CNG-CON	Corsica	1995	Broomfield	CO	GAS
Caravan	1992	Camp Pendelton	CA	CNG-CON	Corsica	1995	Ft. Belvoir	VA	GAS
Caravan	1992	Camp Pendelton	CA	CNG-CON	Crown Victoria	1993	Washington	DC	GAS
Caravan	1992	Bethesda	MD	CNG-CON	Crown Victoria	1993	Dallas	TX	GAS
Caravan	1992	Camp Pendelton	CA	CNG-CON	Crown Victoria	1993	Dallas	TX	GAS
Caravan	1992	Camp Pendelton	CA	CNG-CON	Dodge 1/2 Ton Pick-up	1992	Wagner	SD	GAS
Caravan	1992	Camp Pendelton	CA	CNG-CON	Dodge 15 Passenger Van	1992	Putman	CA	GAS
Caravan	1992	Camp Pendelton	CA	CNG-CON	Dodge 15 Passenger Van	1994	Putman	CA	GAS
Caravan	1992	Santa Ana	CA	CNG-CON	Dodge 3/4 Ton Pick-up	1990	Shoshone	ID	GAS
Chevy 1 Ton Pick-up	1991	Robins AFB	GA	CNG-CON	Dodge Ram Pick-up	1993	Ft. Belvoir	VA	GAS

Chevy 5-10 Pick-up	1989	Dobbins AFB	GA	CNG-CON	Ford 1/2 Ton Pick-up	1993	Frankfort	KY	GAS
Chevy Blazer	1992	Bethesda	MD	CNG-CON	Ford 1/2 Ton Pick-up	1994	Frankfort	KY	GAS
Chevy Pick-up	1990	Robins AFB	GA	CNG-CON	Ford F-150 Pick-up	1995	Tulsa	OK	GAS
Chevy Pick-up	1991	Bethesda	MD	CNG-CON	Ford F-250 Pick-up	1995	Rochester	MN	GAS
Chevy Pick-up	1992	Camp Pendelton	CA	CNG-CON	Ford Van	1993	Golden	CO	GAS
Chevy Pick-up	1993	Dobbins AFB	GA	CNG-CON	Ford Van	1996	Washington	DC	GAS
Chevy Pick-up	1995	Robins AFB	GA	CNG-CON	GMC Van	1993	Providence	RI	GAS
Chevy Pick-up	1995	Robins AFB	GA	CNG-CON	Gran Marquis	1995	Washington	DC	GAS
Chevy C1500	1994	Amarillo	TX	CNG-CON	Lumina	1995	Huntsville	AL	GAS
Chevy C1500	1994	Amarillo	TX	CNG-CON	Ram Van	1995	Putman	CA	GAS
Crown Victoria	1993	Washington	DC	CNG-CON	Spirit	1993	Pueblo	CO	GAS
Corsica	1991	Bethesda	MD	CNG-CON	Taurus	1992	Ft. Meade	MD	GAS
Corsica	1991	Bethesda	MD	CNG-CON	Taurus	1993			GAS
Crown Victoria	1992	Dobbins AFB	GA	CNG-CON	Taurus	1993	Stockton	CA	GAS
Dodge 14 Passenger Van	1995	Camp Pendelton	CA	CNG-CON	Intrepid	1995	Argonne	IL	M85
Dodge 5 Passenger Van	1994	Washington	DC	CNG-CON	Intrepid	1995	Landover	MD	M85
Dodge 7 Passenger Van	1992	Camp Pendelton	CA	CNG-CON	Intrepid	1995	Chicago	IL	M85
Dodge 8 Passenger Van	1988	Camp Pendelton	CA	CNG-CON	Lumina	1993	Argonne	IL	M85
Dodge 8 Passenger Van	1992	Camp Pendelton	CA	CNG-CON	Lumina	1993	Lakewood	CO	M85
Dodge 8 Passenger Van	1992	Camp Pendelton	CA	CNG-CON	Lumina	1993	Chicago	IL	M85
Dodge 8 Passenger Van	1993	Camp Pendelton	CA	CNG-CON	Lumina	1993	Denver	CO	M85
Dodge 8 Passenger Van	1994	Camp Pendelton	CA	CNG-CON	Lumina	1993	Baltimore	MD	M85
Ford 4x4 Pick-up	1990	Dobbins AFB	GA	CNG-CON	Lumina	1993	Madison	WI	M85
Ford F-250 Pick-up	1992	Bethesda	MD	CNG-CON	Lumina	1993	Washington	DC	M85
Ford F-250 Pick-up	1994	Bethesda	MD	CNG-CON	Lumina	1993	Aurora	CO	M85
Ford Pick-up	1990	Santa Ana	CA	CNG-CON	Lumina	1993	Madison	WI	M85
Ford Pick-up	1992	Santa Ana	CA	CNG-CON	Lumina	1994	Aurora	CO	M85
Ford Pick-up	1992	Robins AFB	GA	CNG-CON	Spirit	1992	Dearborn	MI	M85
Ford Pick-up	1993	Camp Pendelton	CA	CNG-CON	Spirit	1993	Argonne	IL	M85
Ford Pick-up	1993	Santa Ana	CA	CNG-CON	Spirit	1993	Clintontownship	MI	M85
Ford Pick-up	1994	Santa Ana	CA	CNG-CON	Spirit	1993	Denver	CO	M85
Ford Pick-up	1994	Bethesda	MD	CNG-CON	Spirit	1993	Aurora	CO	M85
Ford Pick-up	1994	Santa Ana	CA	CNG-CON	Spirit	1993	Forest Park	GA	M85
Ford Ranger	1990	Santa Ana	CA	CNG-CON	Spirit	1993	Hagerstown	MD	M85
Ford Ranger	1992	Santa Ana	CA	CNG-CON	Spirit	1993	Aurora	CO	M85
Ford Ranger	1992	Santa Ana	CA	CNG-CON	Spirit	1993	Baltimore	MD	M85
Ford Ranger	1992	Santa Ana	CA	CNG-CON	Spirit	1993	Baltimore	MD	M85
Ford Ranger	1994	Santa Ana	CA	CNG-CON	Spirit	1993	Fort Belvoir	VA	M85
GMC Pick-up	1994	Washington	DC	CNG-CON	Spirit	1993	Fort Belvoir	VA	M85
Taurus	1991	Bethesda	MD	CNG-CON	Spirit	1993	Royal Oak	MI	M85
Various		Bethesda	MD	CNG-CON	Spirit	1993	Denver	CO	M85
Lumina	1992	Washington	DC	E85	Spirit	1993	Landover	MD	M85
Lumina	1992	Pierre	SD	E85	Spirit	1993	Lakewood	CO	M85
Lumina	1993	Argonne	IL	E85	Spirit	1993	Lakewood	CO	M85
Lumina	1993	Washington	DC	E85	Spirit	1993	Lakewood	CO	M85
Lumina	1993	Indianapolis	IN	E85	Spirit	1993	Denver	CO	M85
Lumina	1993	Pierre	SD	E85	Spirit	1993	Aurora	CO	M85
Lumina	1993	Madison	WI	E85	Spirit	1993	Vienna	VA	M85
Lumina	1993	Chicago	IL	E85	Spirit	1993	Washington	DC	M85
Lumina	1993	Madison	WI	E85	Spirit	1993	Herndon	VA	M85
Lumina	1993	Indianapolis	IN	E85	Spirit	1993	Baltimore	MD	M85
Lumina	1993	Washington	DC	E85	Spirit	1993	Denver	CO	M85
Lumina	1993	Washington	DC	E85	Spirit	1993	Denver	CO	M85
Lumina	1993	Springfield	IL	E85	Spirit	1993	Washington	DC	M85
Lumina	1993	Springfield	IL	E85	Spirit	1993	Washington	DC	M85
Lumina	1993	Kankakee	IL	E85	Spirit	1993	Landover	MD	M85
Lumina	1993	Washington	DC	E85	Spirit	1993	Golden	CO	M85
Lumina	1993	Indianapolis	IN	E85	Spirit	1993	Ann Arbor	MI	M85
Lumina	1993	Madison	WI	E85	Spirit	1993	Westland	MI	M85
Lumina	1994	Washington	DC	E85	Spirit	1993	Argonne	IL	M85
Lumina	1994	Madison	WI	E85	Spirit	1994	Burlingame	CA	M85
Lumina	1994	Chicago	IL	E85	Taurus	1993	Dearborn	MI	M85

Taurus	1994	Argonne	IL	E85	Taurus	1993	Denver	CO	M85
					Taurus	1994	Argonne	IL	M85